DSDC '96
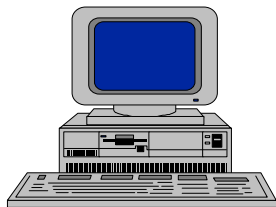
SHARED DATA WAREHOUSE

Presented By: Name: Christina Ooten
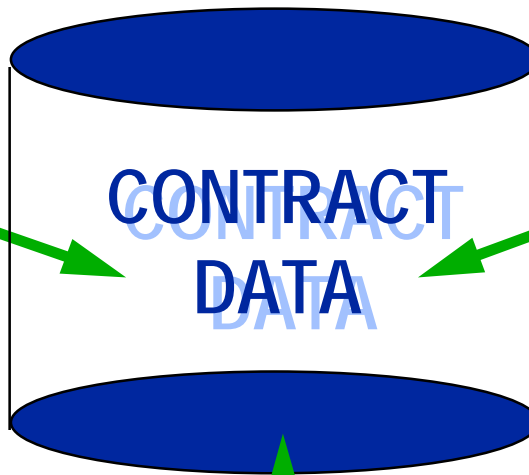   DSDC- MPO
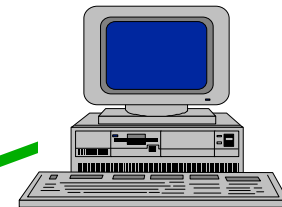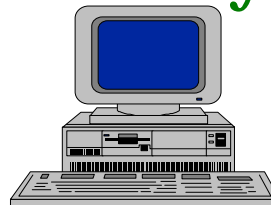   (614) 692-9944

SHARED DATA WAREHOUSE
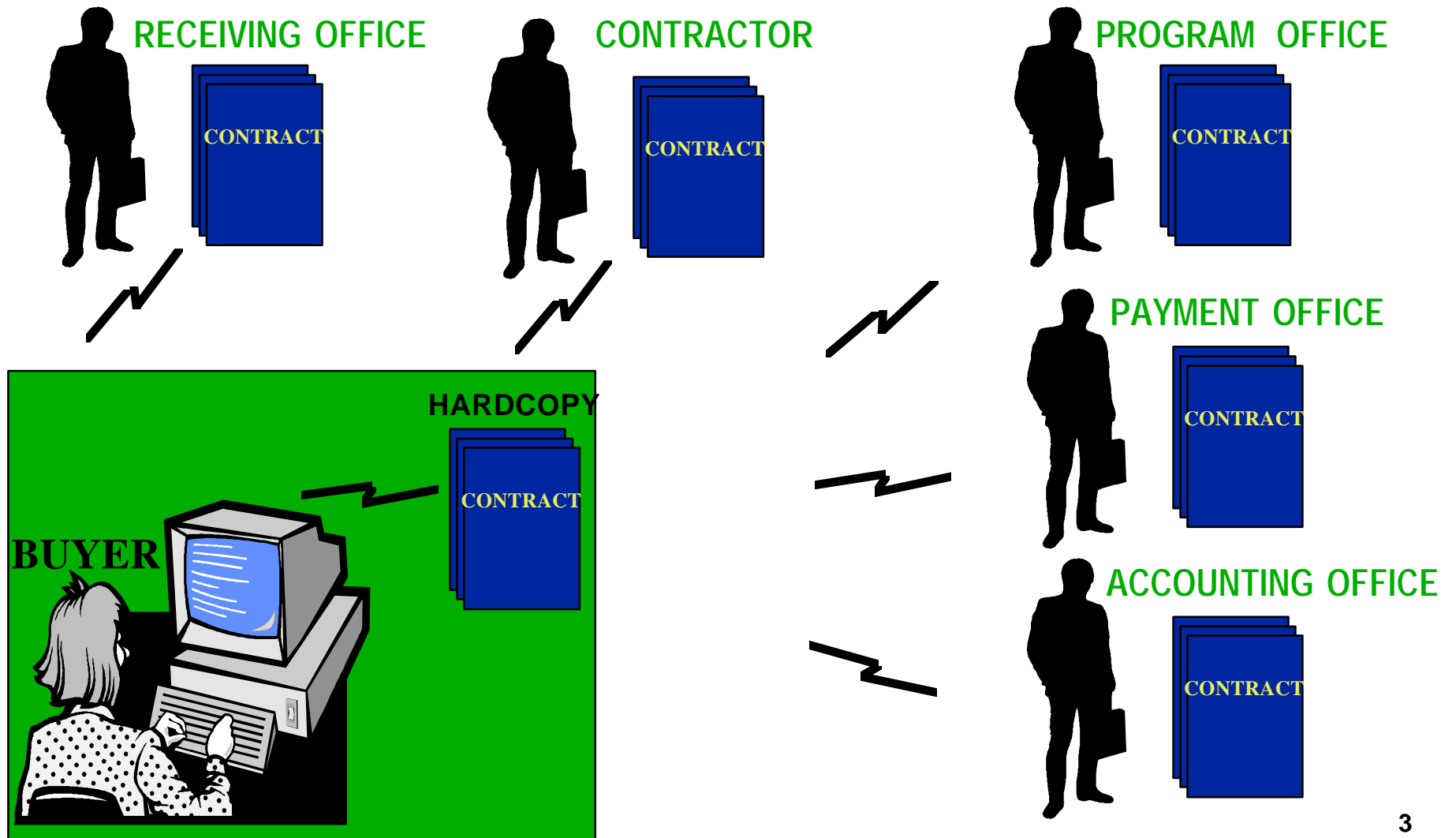
Contract Placement
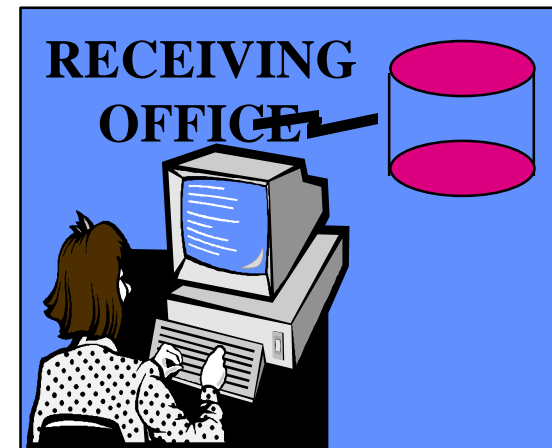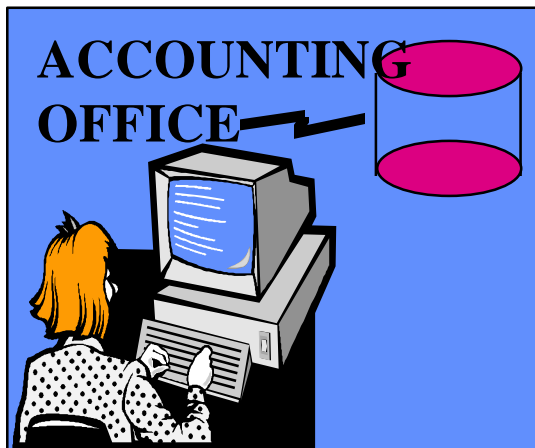
Contract Administration

CONTRACT
DATA

Contract Payment

Contract Printed & Mailed

RECEIVING OFFICE

CONTRACT

CONTRACTOR

CONTRACT

PROGRAM OFFICE

CONTRACT

PAYMENT OFFICE

CONTRACT

HARDCOPY

CONTRACT

BUYER

ACCOUNTING OFFICE
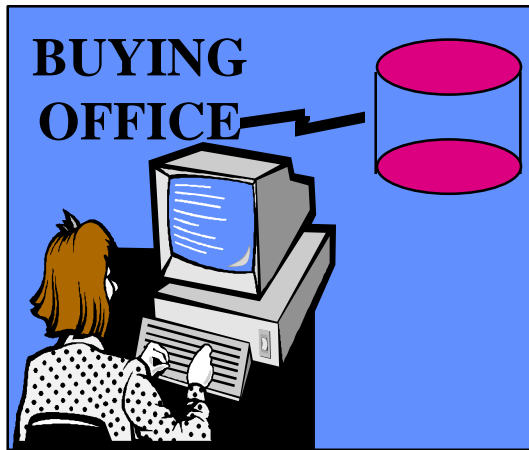
CONTRACT
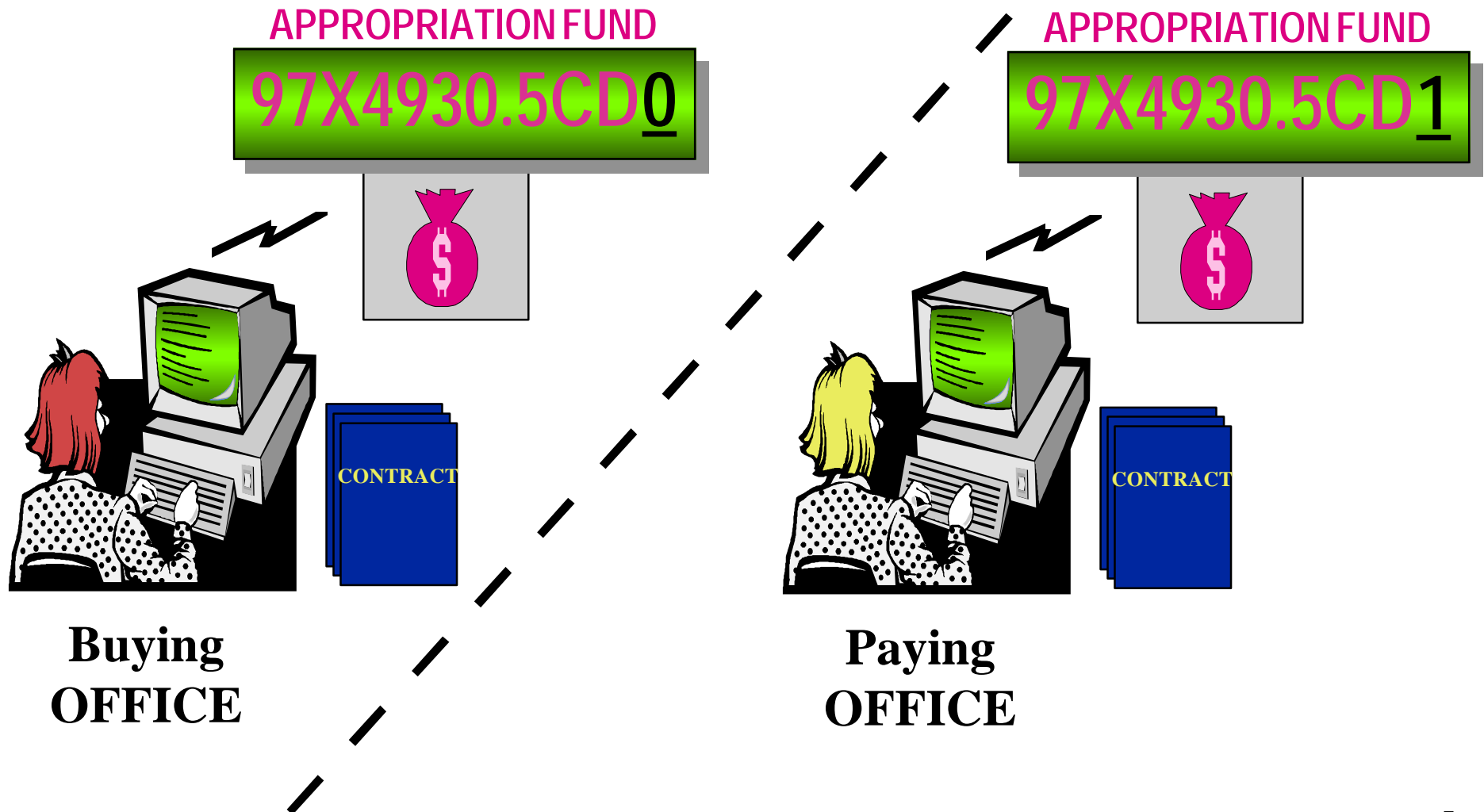
Contract Is Re-Keyed !
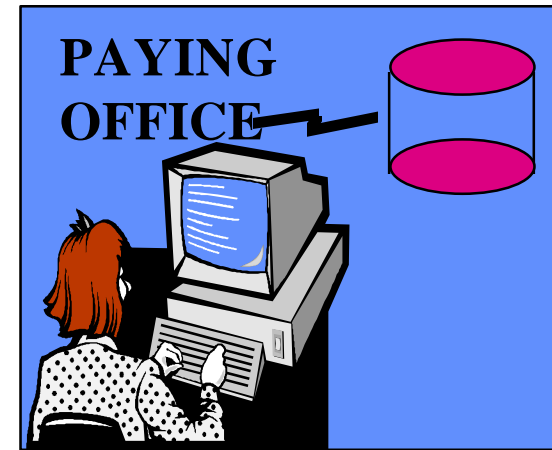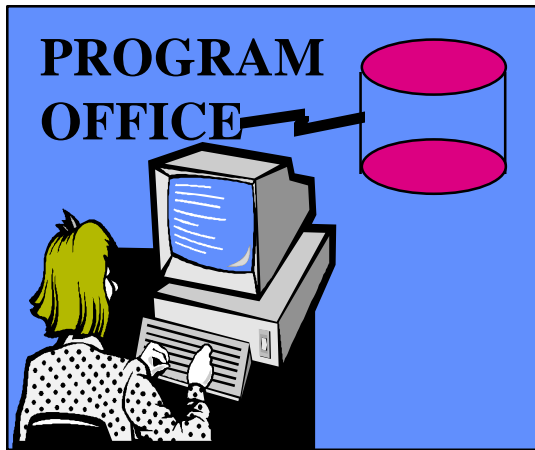
Rekeying Means Opportunity For Errors

APPROPRIATION FUND

97X4930.5CD<u>0</u>

APPROPRIATION FUND

97X4930.5CD<u>1</u>

CONTRACT

CONTRACT

Buying OFFICE

Paying OFFICE

Payment Posted To Wrong Account

PAYING OFFICE

CHECK

CONTRACTOR
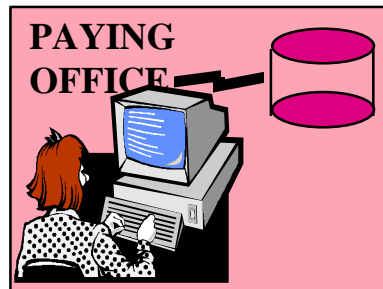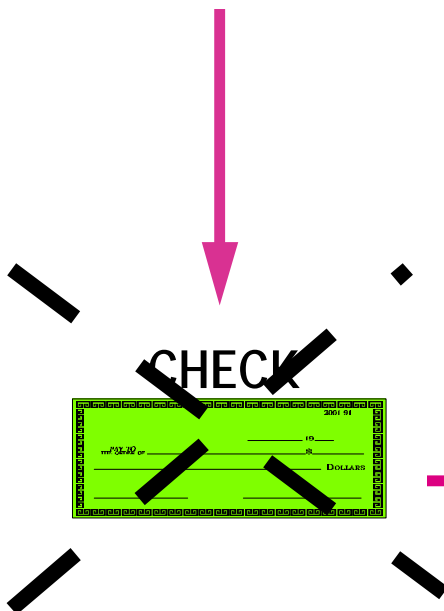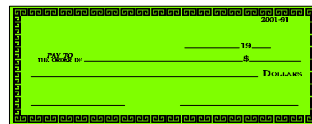
97X4930.5CD**1**

97X4930.5CD**0**

ACCOUNTING OFFICE

?

CHECK

97X4930.5CD**1**

0.00
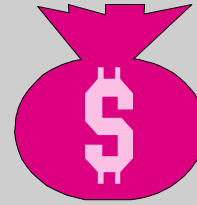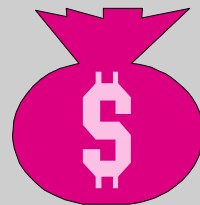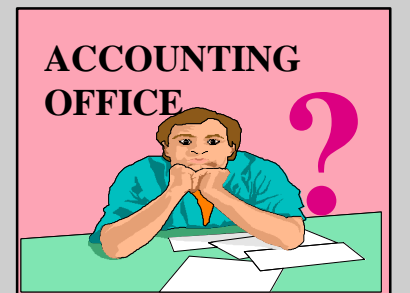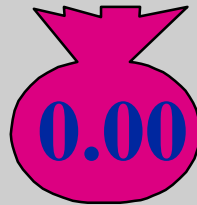
1994: UNMATCHED DISBURSEMENTS
12 BILLION DOLLARS

97X4930.5CD**1**

CHECK
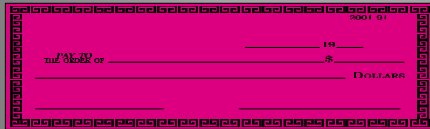
97X4930.5CD**0**

Appropriation Account
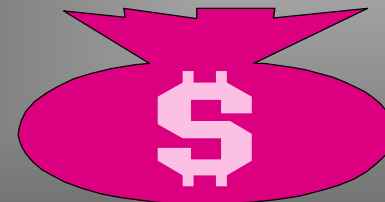
Eliminate Redundant Updates
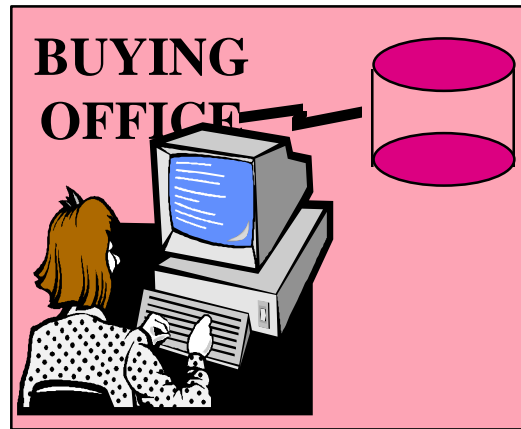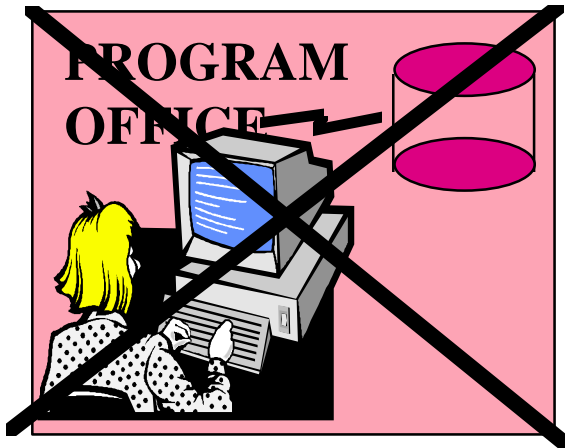
Eliminate Geographically Dispersed Data
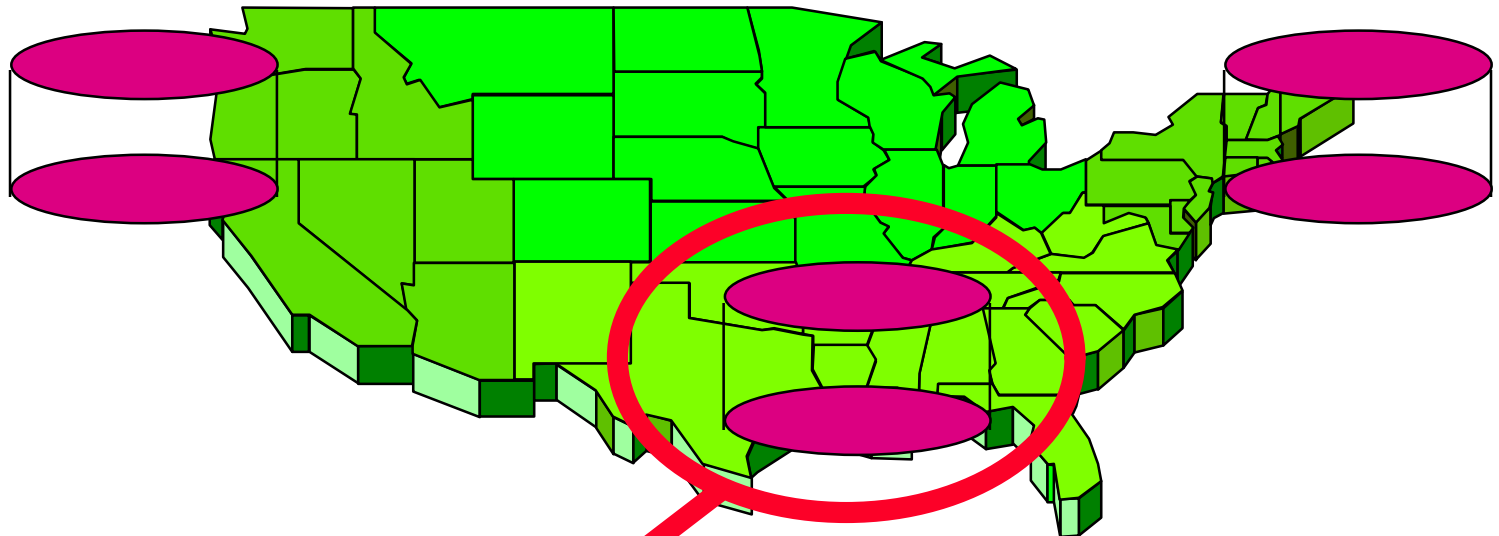
ADMINISTERING OFFICE
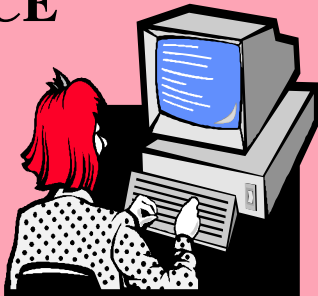
ONE SHARED DATABASE

ADMINISTERING OFFICE

11

OPTIMIZED FOR UPDATES

Contract

On-**L**ine **T**ransaction **P**rocessing (**OLTP**)

Vendor

DoD Activity

Fund Cite

Mods

Line Item

Schedule

Update to Line Item

Relational Database Structure
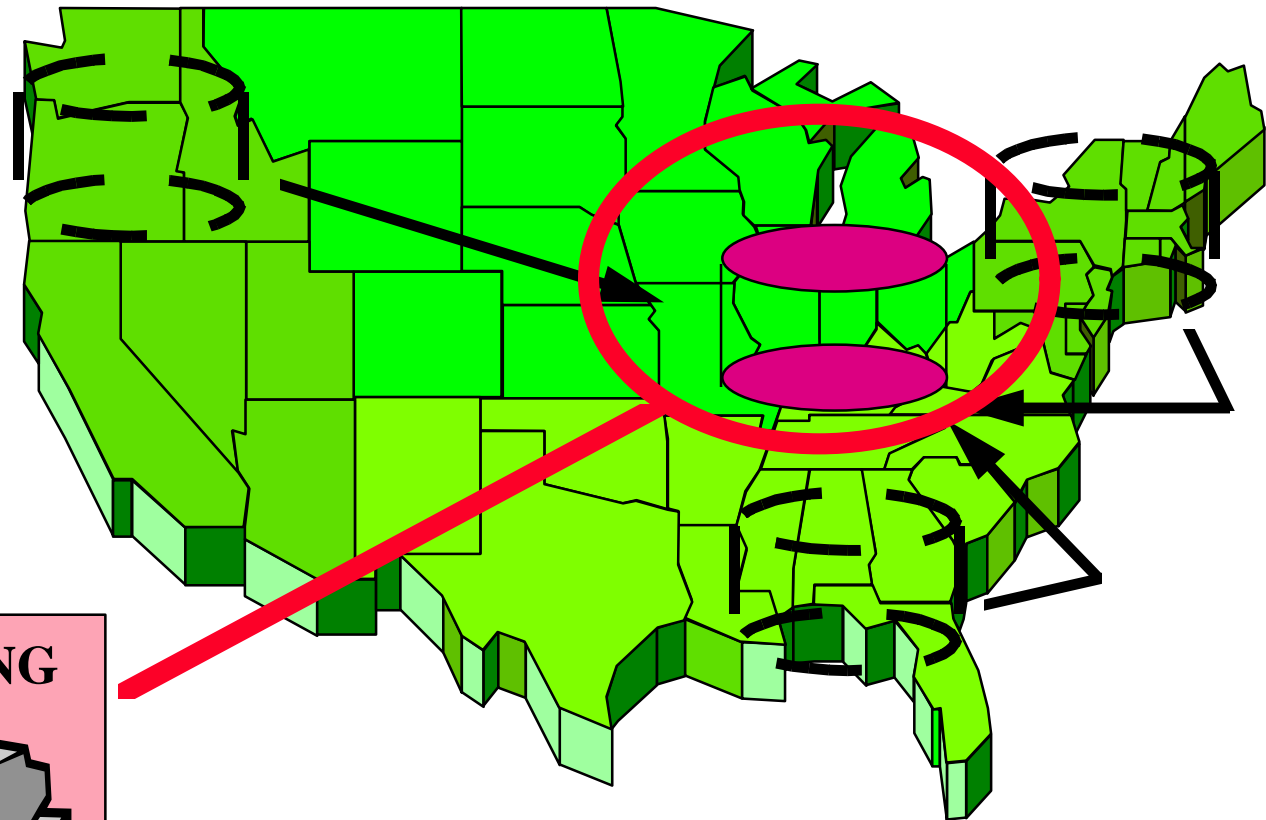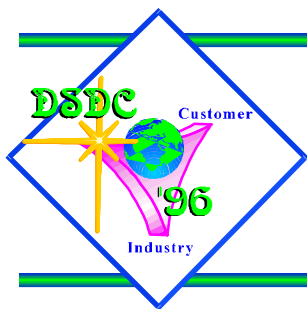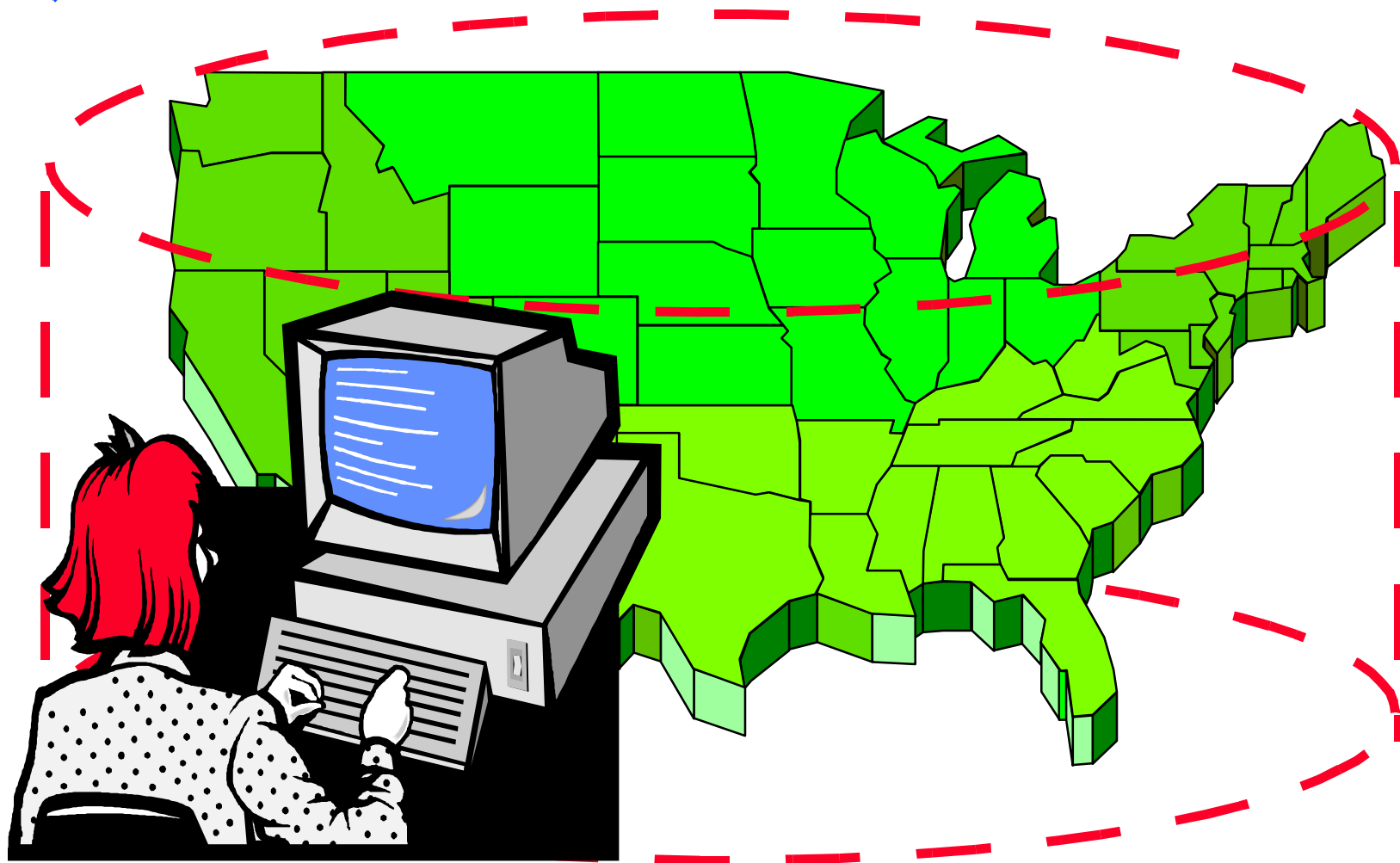
Typical OLTP Database Design
Slow For Query Processing!

On-Line Transaction Processing (OLTP)

OPTIMIZED FOR UPDATES (inefficient for query)

User Query → Contract → Vendor, DoD Activity, Fund Cite, Mods, Line Item, Schedule
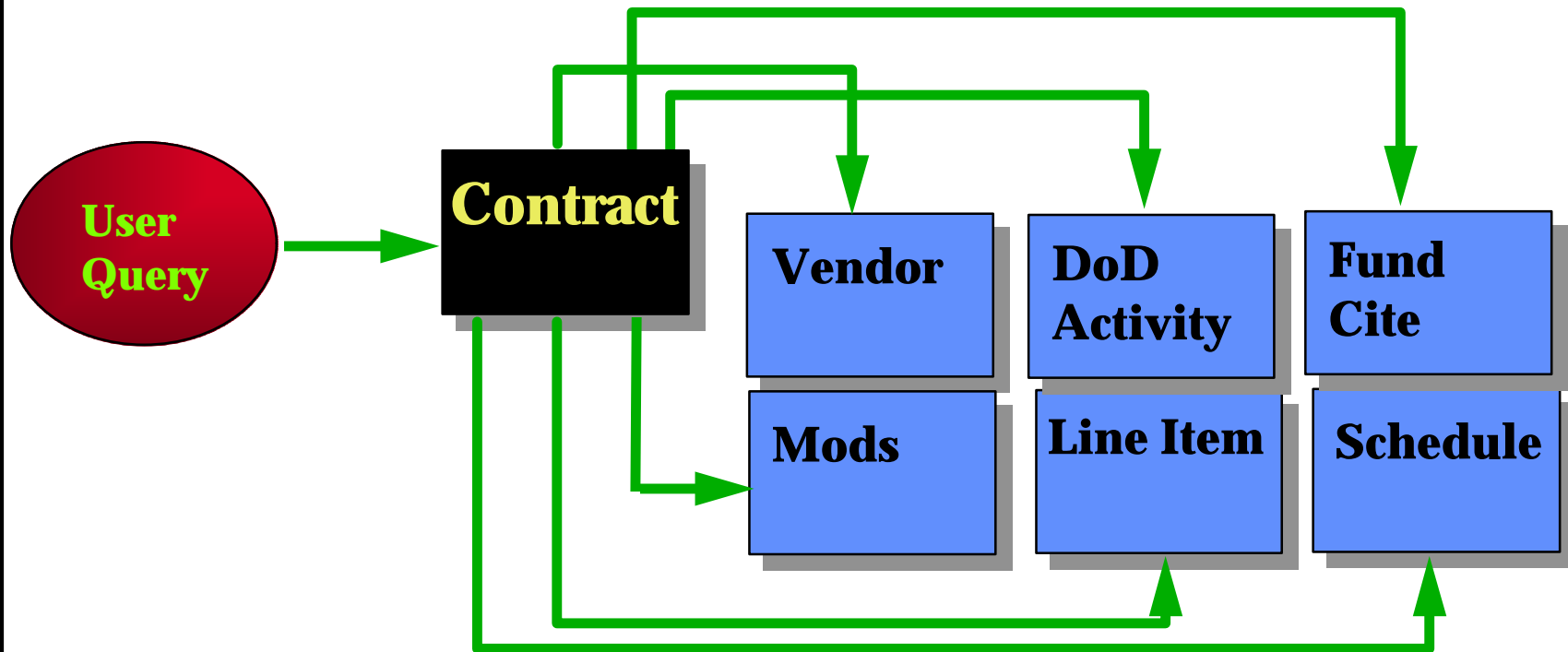
Relational Database Structure

Data Warehouse OLAP Database Design (denormalized & summarized)

MANAGED QUERY ENVIRONMENT

On-**L**ine **A**nalytical **P**rocessing (**OLAP**)

User Query

Contract
Totals

Vendor

DoD Activity

Fund Cite

Mods

Line Item

Schedule

Relational Database Structure

14

Data Warehouse OLAP Database Design (highly summarized)

OPTIMIZED FOR SLICING AND DICING

On-**L**ine **A**nalytical **P**rocessing (**OLAP**)

Key: Line Item

Key: Contract

Key: Vendor

Key: DoD Activity

Number Of Line Items
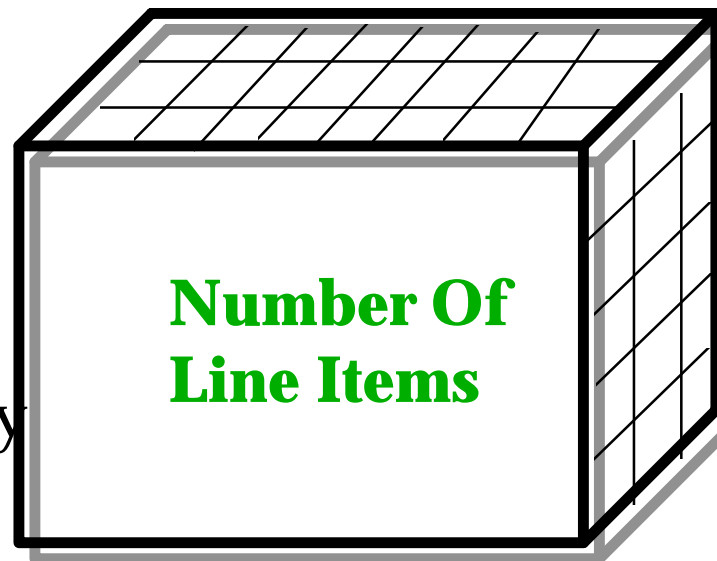
Key: Fund Cite

Key: Modification

Key: Schedule

Key: Rec. Activity

Multidimensional Database Structure

SDW Will Create A New
OLTP Database Structure

MOCAS
Procurement Data

EC/EDI
Contracting Data

MOCAS
Finance Data

Shared Data Warehouse (update DB)

16
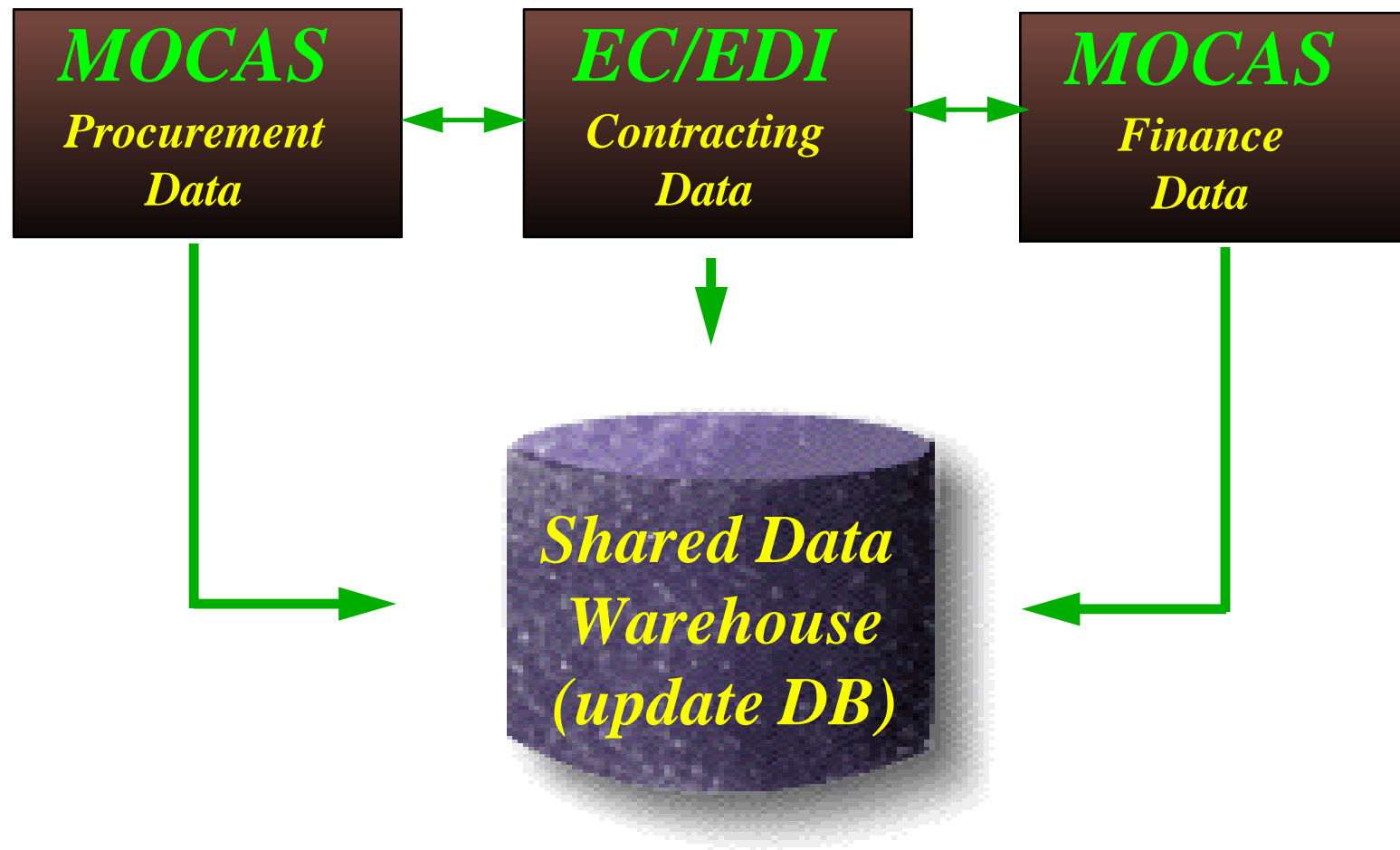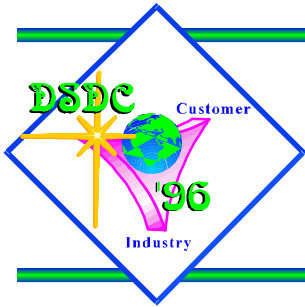
SDW Will Not Use OLTP Structure For Query Processing

Queries Would Be Slow!

Detail data stored in many tables (normalization).

SDW Update DB Structure
(optimized for update)

(OLTP)

Contract

| Vendor | DoD Act. | Fund Cite |
| Mods | Line Item | Schedule |
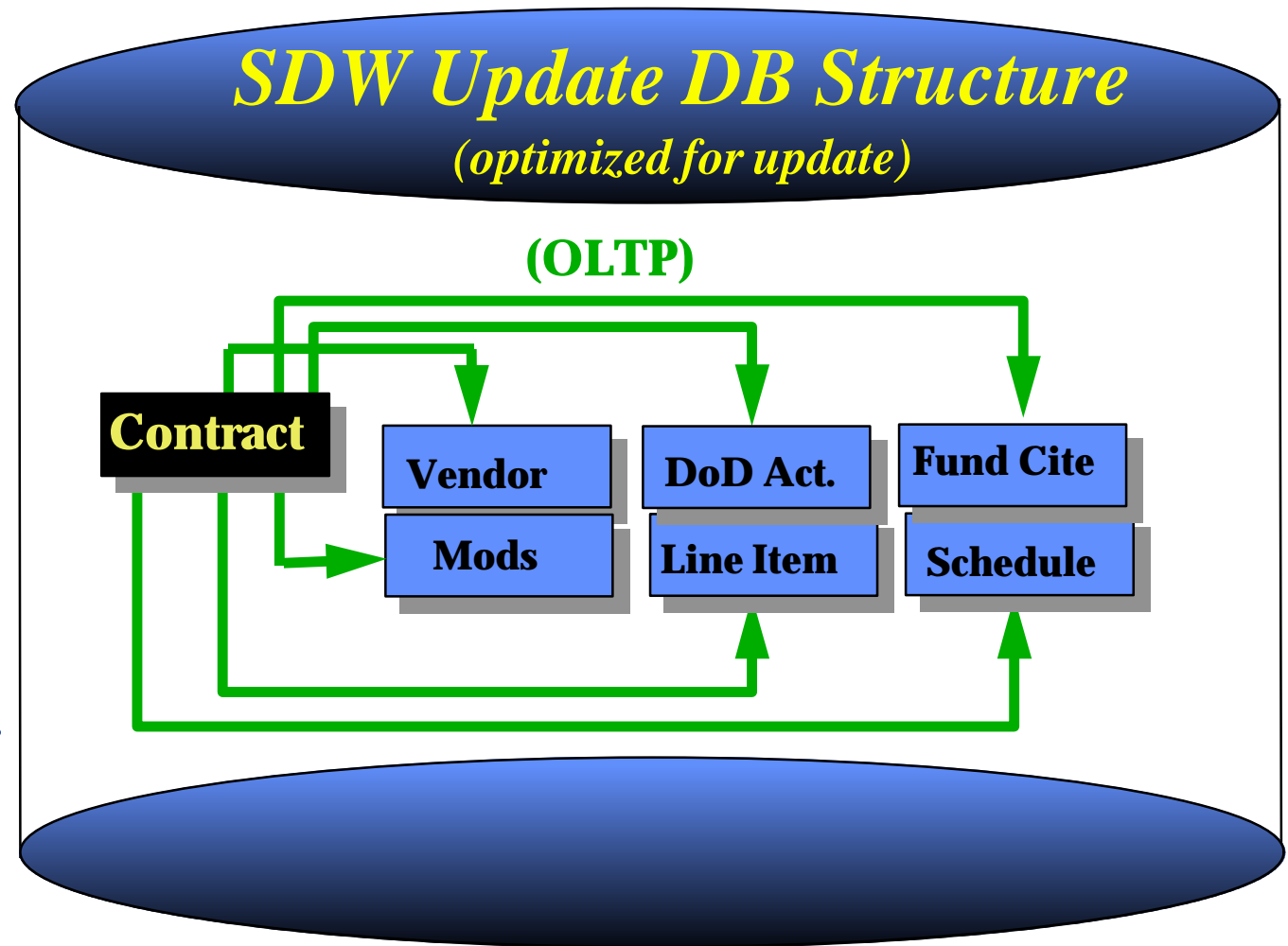
SDW Relational
On-Line Analytical Processing (ROLAP)

Queries Are Faster

Detail data stored in fewer tables (de-normalization).

Moderately summarized data added.

SDW Query DB Structure
(optimized for query)

(OLAP)

Contract	Vendor	DoD Activity	Fund Cite	Sum Fields
Totals				

Mods   Line Item   Schedule   Sum Fields
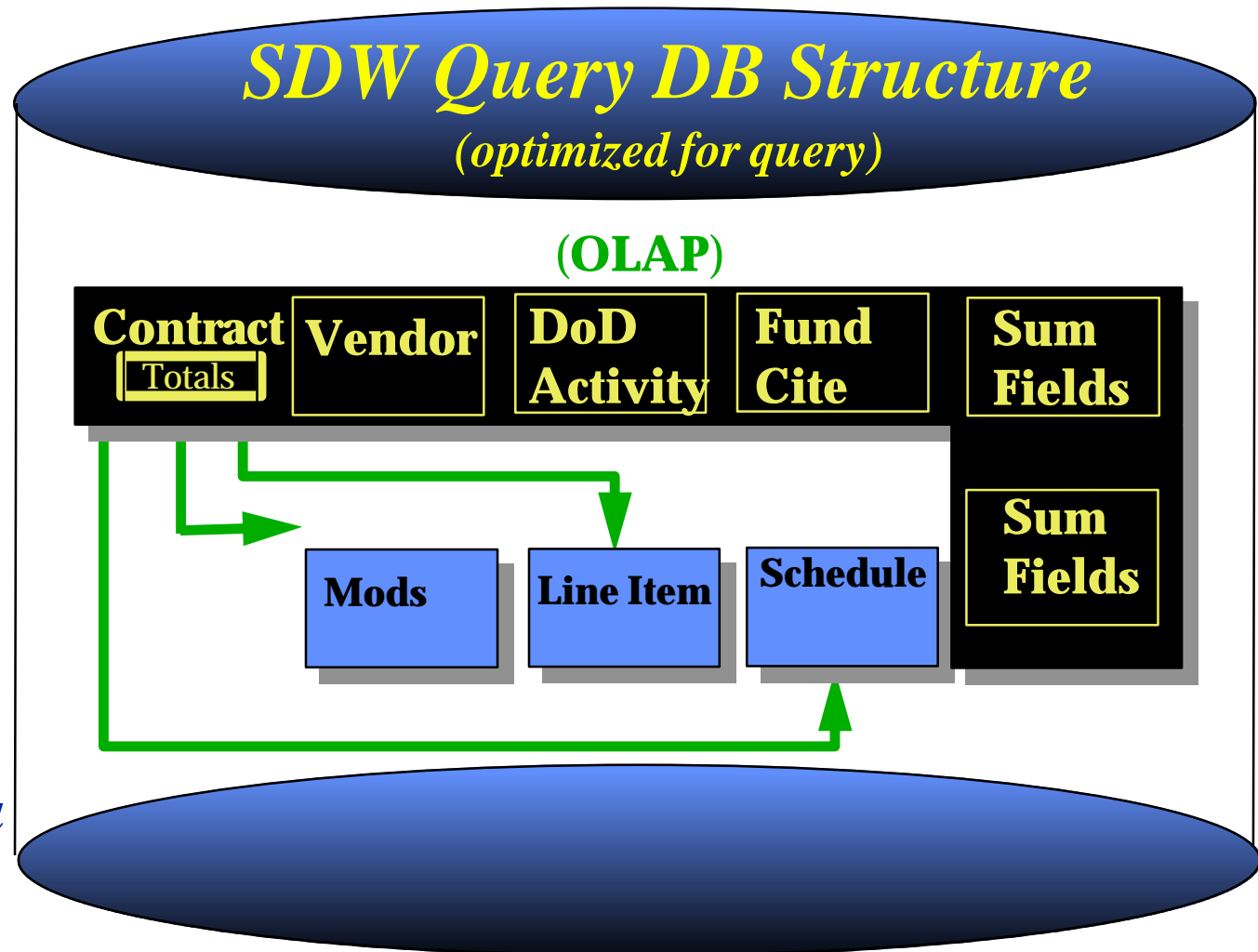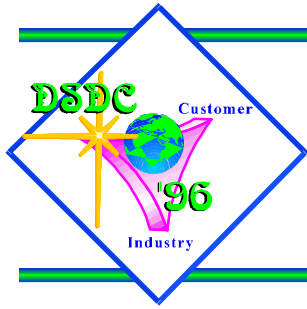
- ## *Decision Support Queries Are Fast!*

- *No Detail Data*

- *Highly summarized data instead of moderately summarized data.*
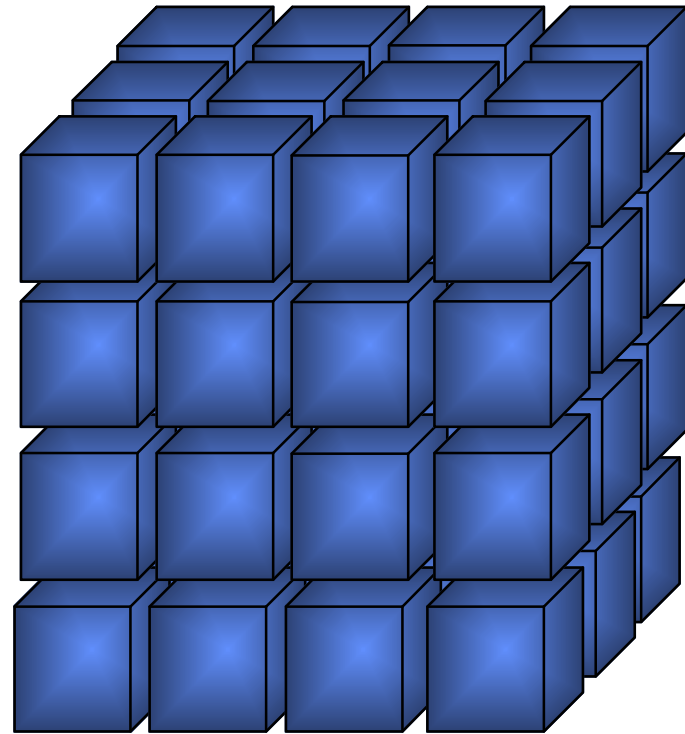
Transaction Processing
(optimized for update)

Data Warehouse
(optimized for query)

Update Query

DETAIL DATA	OLTP
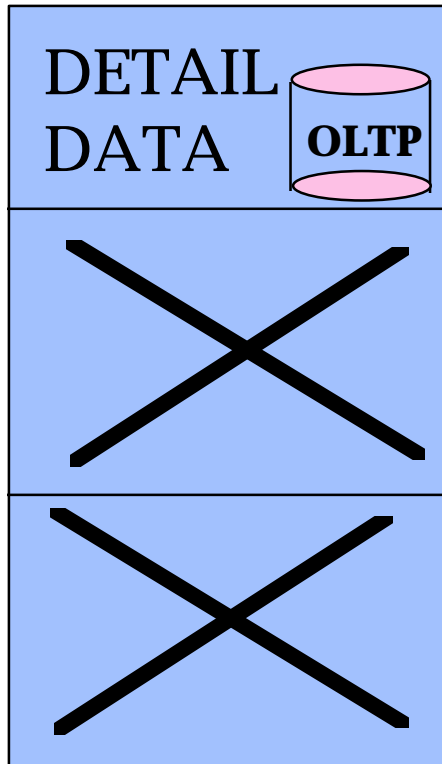
Relational

Relational

Multi-Dimensional

DETAIL DATA	OLTP
Moderately Summarized Data	OLAP
Highly Summarized Data	OLAP

Query

20

Production Database

Data Warehouse

OLTP

Detail Data
(normalized)

Relational

ROLAP

Detail Data
(denormalized)

Mod. Sum. Data

Relational

MOLAP

Highly Sum. Data

Multidimensional

SDW ENVIRONMENT
(MOCAS to SDW OLTP)

Changes to MOCAS

HP K400

Technical Bridge

Convert from Supra to Oracle

DB Server: HP T520

OLTP

Detail Data

(normalized)

No Users

DB Server: HP T520

HP K400

Technical Bridge

Convert from Supra to Oracle

OLTP

Detail Data

(normalized)

EXTRACT

Data Warehouse Pgm

Data Warehouse

Denormalized Detail

Summary

No Users

User Queries

23

DB Server: HP T520

ROLAP

Detail
Data
(denormalized)

Mod.
Sum.
Data

Relational

EXTRACT

Cognos or
Oracle
Express

MOLAP

Highly
Sum.
Data

Multidimensional

MOLAP

Cognos

24
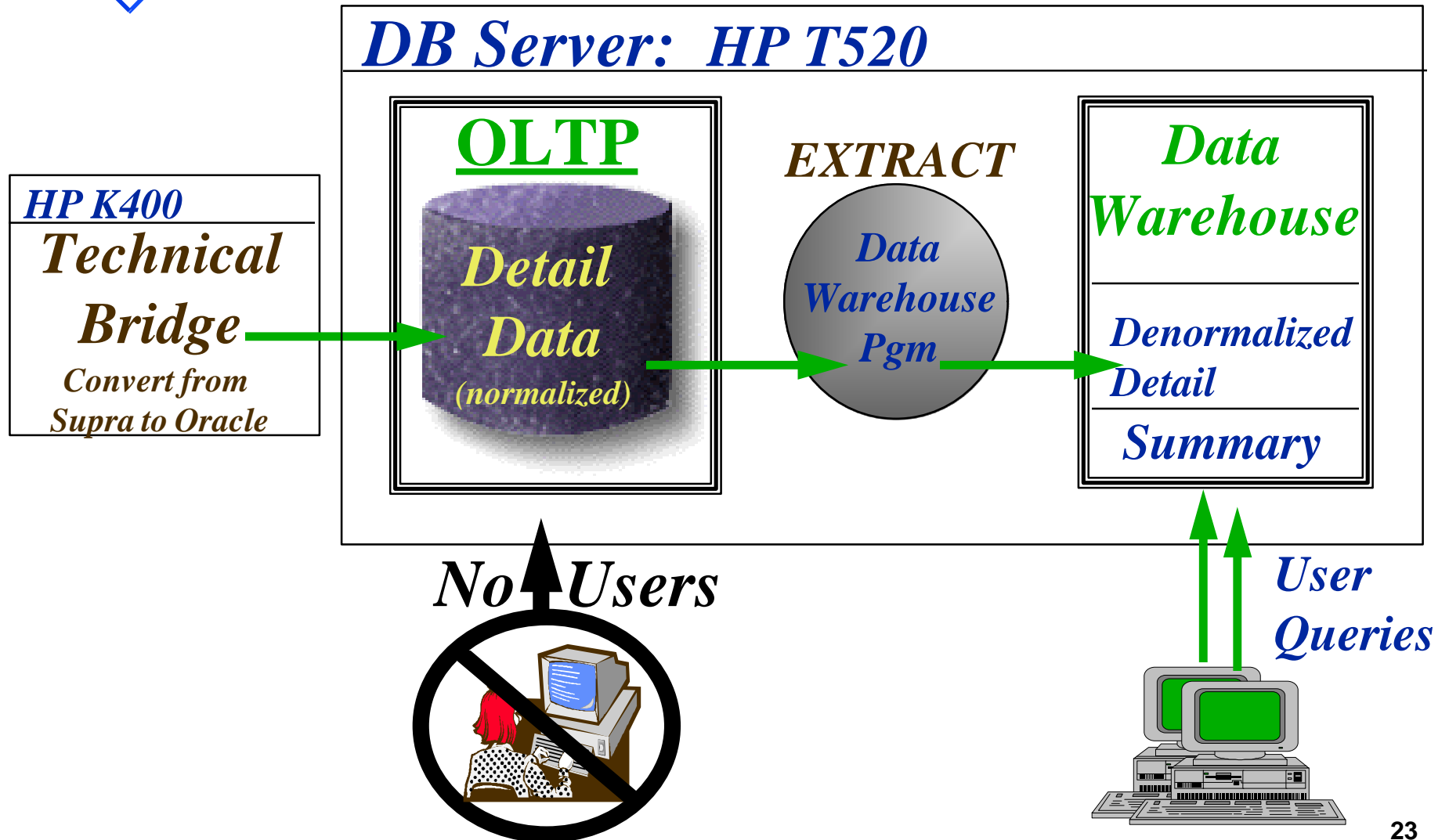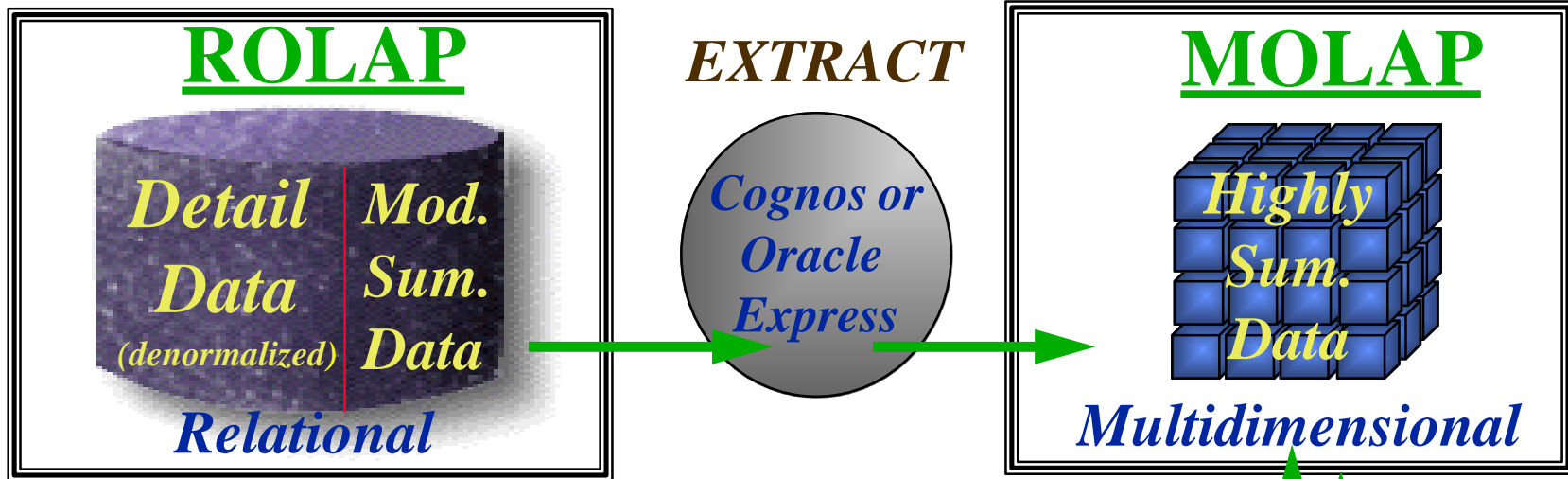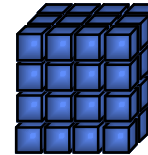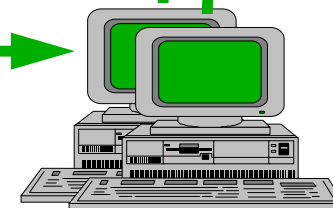
SDW ENVIRONMENT
(Query Only)

DSDC Customer '96 Industry

HP K400

MOCAS

Technical Bridge

Hewlett Packard HP 9000 Series T520

Production Database

Data Warehouse

OLTP

ROLAP   MOLAP

User Queries
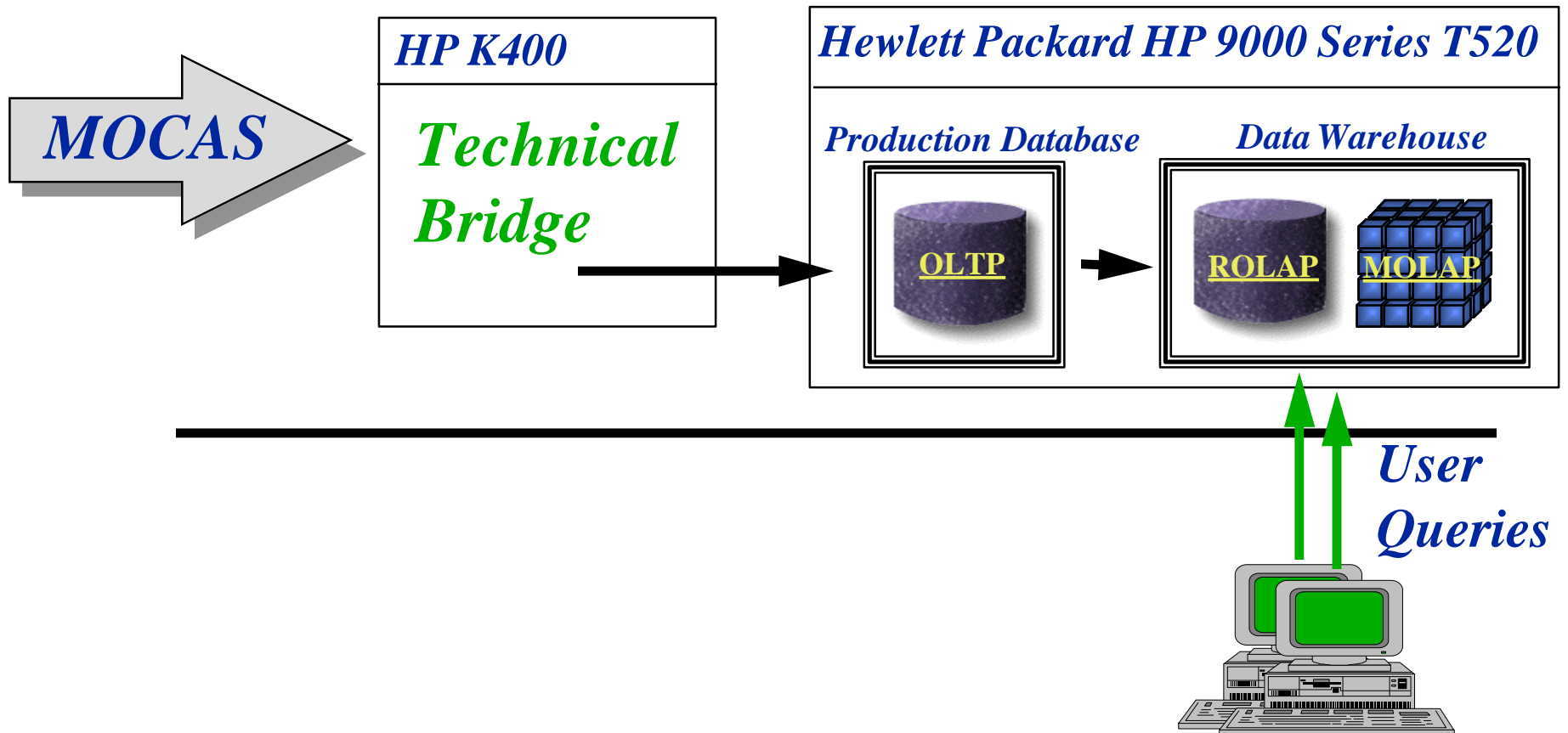
SDW ENVIRONMENT
(Production Version - Update & Query)

HP K400

Technical Bridge

HP ????

Production DB

OLTP

HP 9000 Series T520

Shadow DB

OLTP

Data Warehouse

ROLAP   MOLAP

MOCAS

User Updates

User Queries
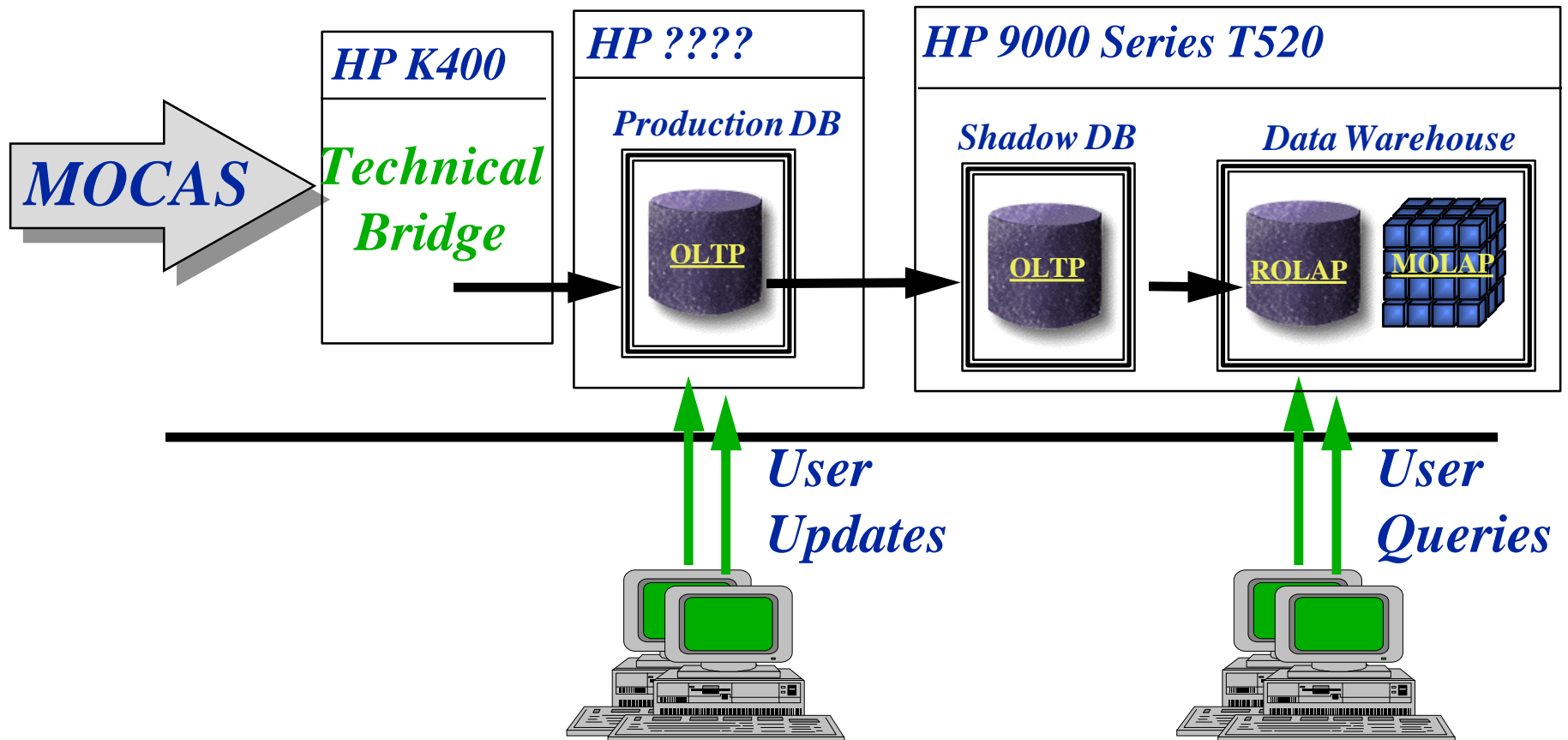
SDW Database Server Technology

The SDW Database Server is a *Symmetrical Multi-Processor* (SMP)

In the future, the SDW Database Server could migrate to a *Massively Parallel Processor* (MPP)

SMP

MPP

SMP is FASTER than MPP.
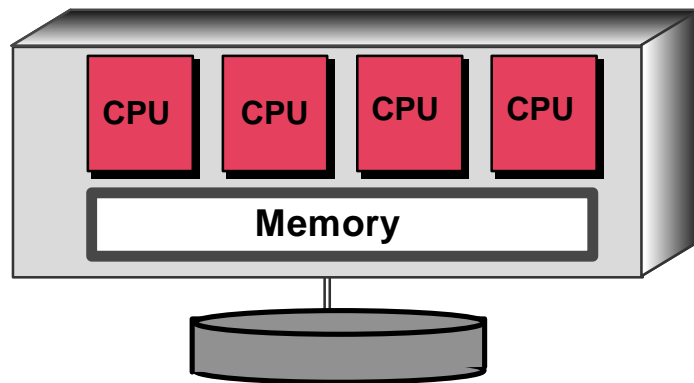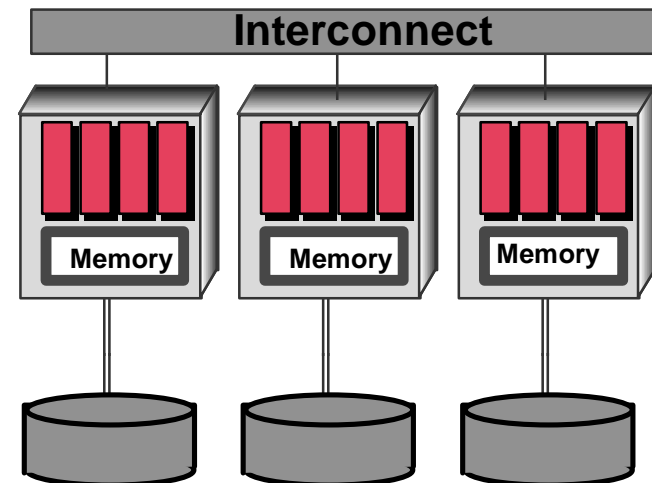
MPP handles more processing than SMP.

All tasks within a query waiting for a single processor

CPU   CPU   CPU   CPU

1
2
3
4

Query

28
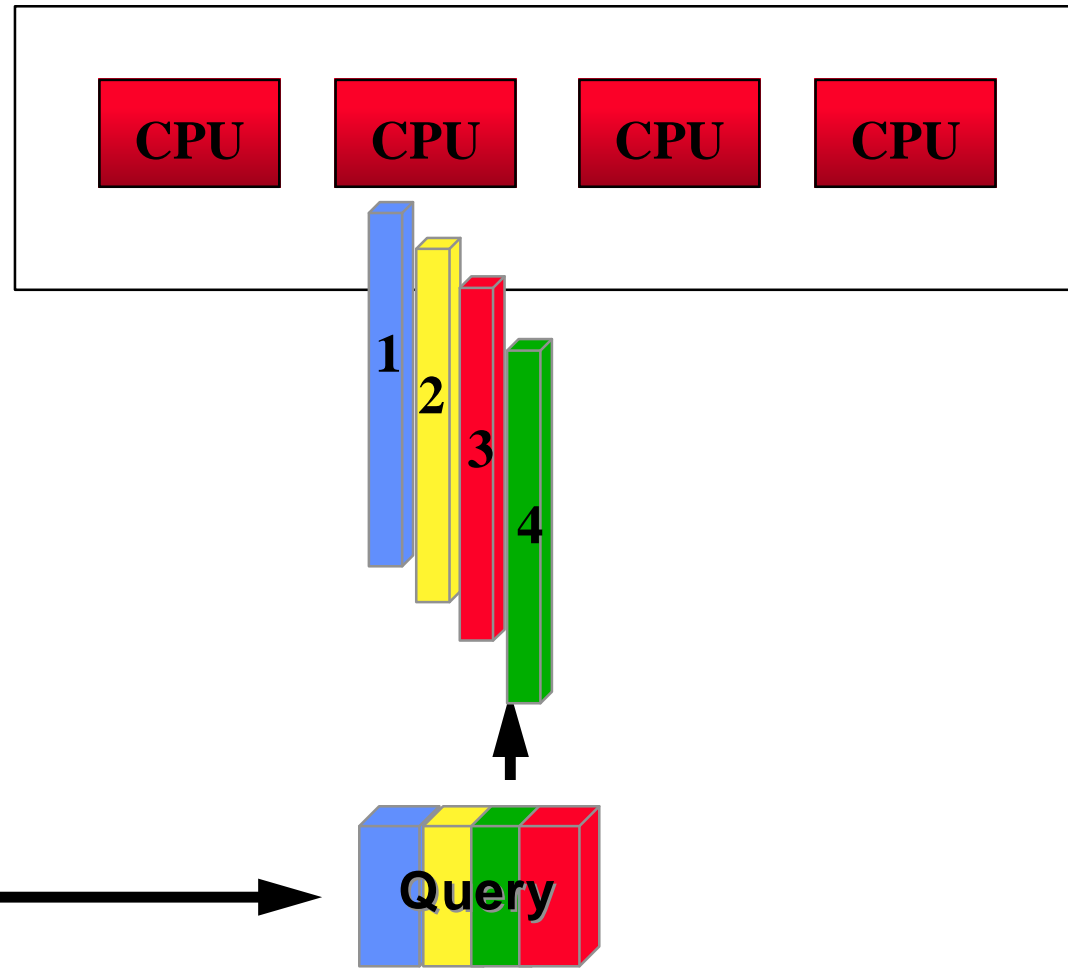
SDW Database Server with Parallel Query

Each task within a query being executed by a separate CPU.

CPU CPU CPU CPU

Oracle Parallel Query

Query

29
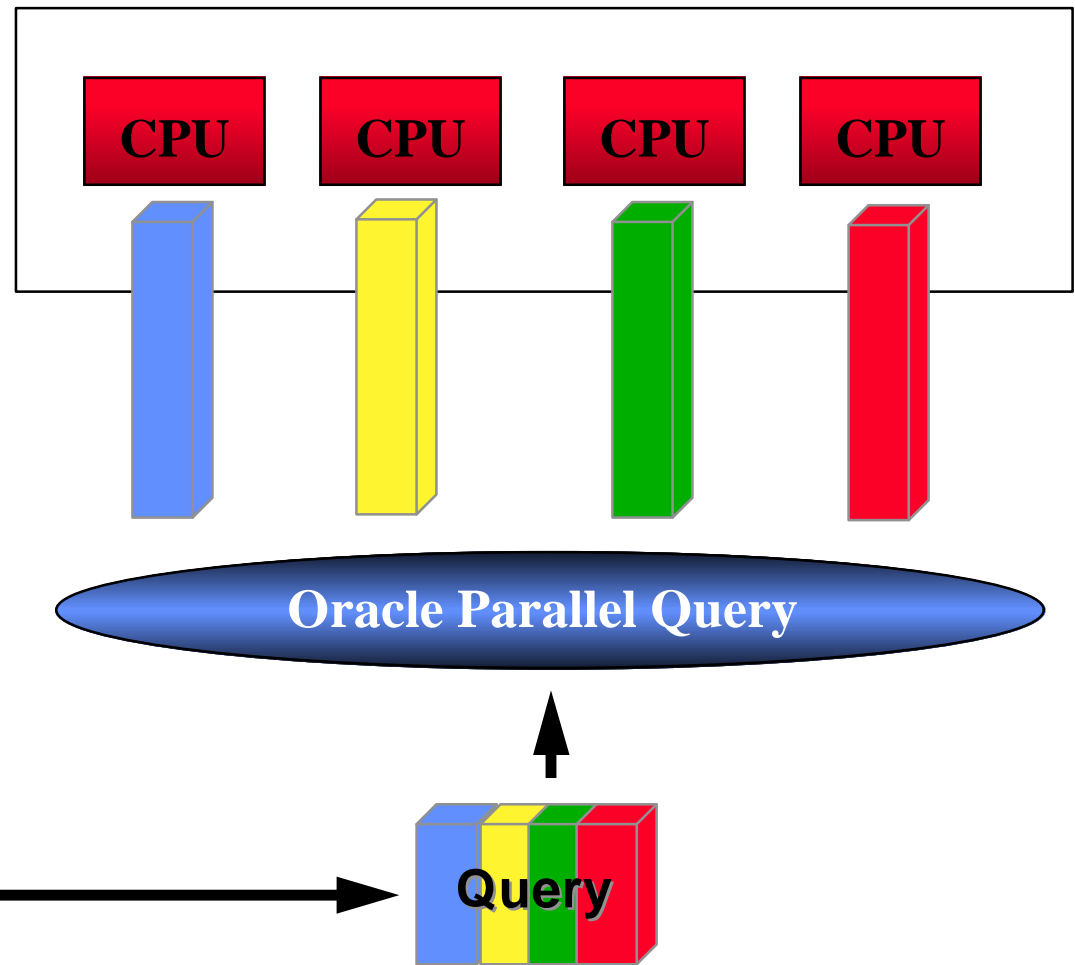
SDW Database Available Via The Web

SDW Access → **COGNOS** → **SQL*Net**

DYNAMIC INFO (via database access)

SDW DATABASE SERVER MACHINE

Oracle Server

WEB Access → **NETSCAPE**

STATIC INFO (via Web access)

Internet

WEB SERVER MACHINE

.html documents
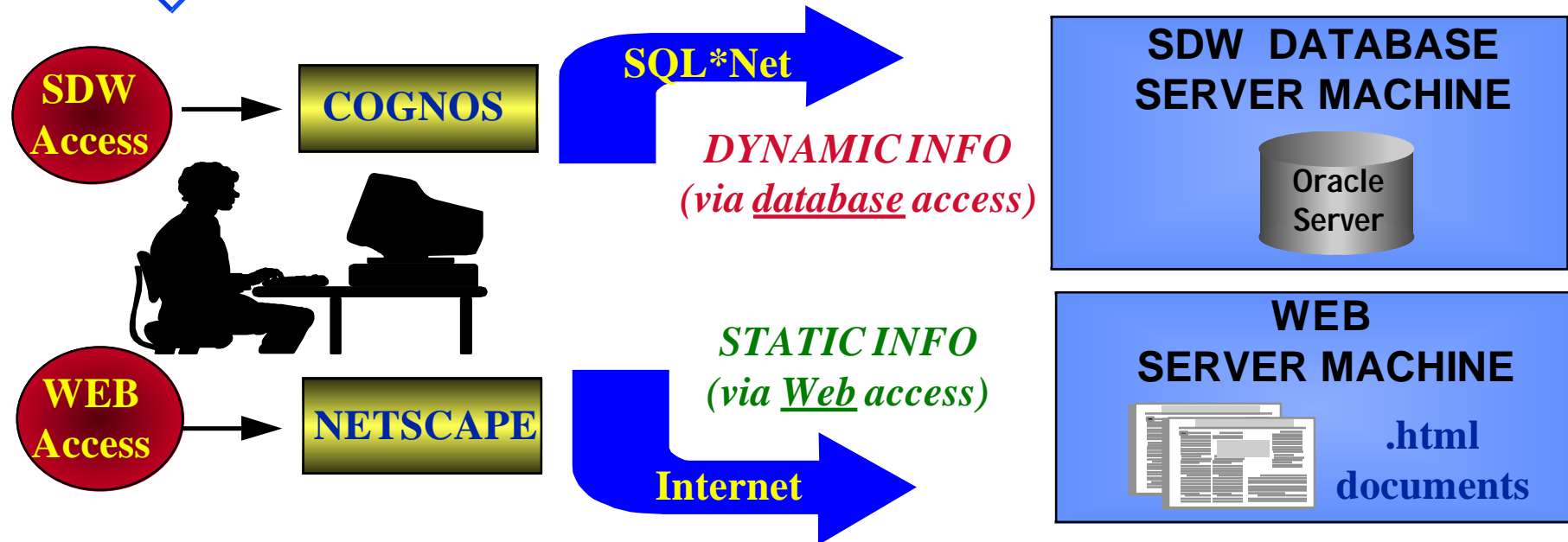
Data Available Via The Web Directly From SDW DB!

SDW WEB → **NETSCAPE** → **Internet**

SDW DATABASE SERVER MACHINE

Oracle Server
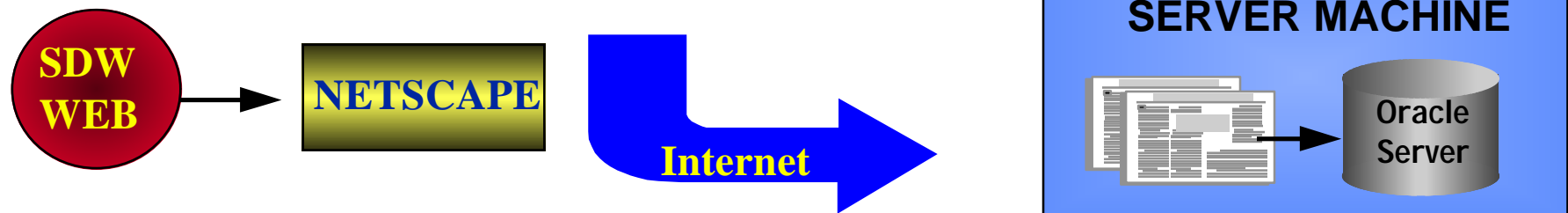
SDW Summary

OLTP — Update Contracting Database

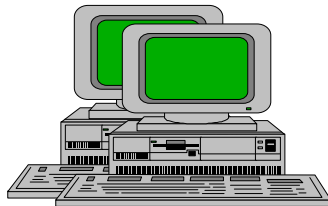**ROLAP** — Query Data Warehouse (detail & summary data)

MOLAP — Decision Support Data Warehouse (highly summarized data)

Decision Support System (DSS) Prototype

WEB Access → SDW Database Access Via The Web!

SHARED DATA WAREHOUSE

Presented By: Name: Christina |Ooten
                 DSDC-MPO
                 (614) 692-9944
                 DSN 850-9944
        Email: cooten@dsdc.dla.mil